# Sensitivity of Activation Cross Sections of Tungsten to Nuclear Reaction Mechanisms

Vlad Avrigeanu[1], Randy Eichin [2], Robin A. Forrest[3], Hartwiq Freiesleben[2], Klaus Seidel[2]

[1] *"Horia Hulubei" National Institute for Physics and Nuclear Engineering, P.O.Box MG-6, 76900 Bucharest, Romania*
[2] *Technische Universität Dresden, D-01062 Dresden, Germany*
[3] *EURATOM/UKAEA Fusion Association, Culham Science Center, Abingdon OX143DB, United Kingdom*

Tungsten is a material widely used in fusion technology. The radioactivity induced in tungsten by D-T fusion neutrons is relevant to safety aspects and to waste management of power plants. A benchmark experiment with pure W irradiated by 14 MeV neutrons showed for several of the dominantly produced radionuclide ratios of calculated-to-experimental activity (C/E) that were significantly above unity [1,2], when calculated with the European Activation System (EASY). In order to reduce the deviation of C from E a detailed analysis of the activation cross sections was carried out using the computer codes EMPIRE-II and TALYS as well as local parameter sets within the STAPRE-H code. The consistent input-parameter set in the last case and the independent data used for its determination and validation are presented. There include the optical model potentials, the corresponding neutron-resonance data, neutron total cross sections, proton reaction cross sections, the low-lying level and resonance data involved for determination of the level density parameters within the realistic approach recently developed. In addition the $\gamma$-ray strength functions $f_{E1}(E_\gamma)$ which are used for the calculation of the $\gamma$-ray transmission coefficients and the corresponding capture cross sections are also presented. The recent measurements [3] of the neutron total cross sections for the $^{182,183,184,186}$W isotopes were in particular used in an analysis of the deformed optical potential within the coupled-channels model to provide the neutron transmission coefficients in the entrance channel. Finally, the sensitivity of the calculated cross sections to various model parameters is derived and discussed in connection with improving the C/E of the benchmark experiment.

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Email: vavrig@ifin.nipne.ro